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BIOCHEMICAL INVESTIGATION OF "*Coriandrum sativum*" L. (CORIANDER)

K.A.Mahamane[1], P.P.Ahire[2], Y.D.Nikam[3]
[1,2,3] *Department of Botany & research Centre, K.T.H.M.College, NASHIK-422002.*

Abstract

Many important nutrient aspects are essential for the human bodies which are studied through biochemical compositions. The seasonal variation of chlorophyll, protein, & amino acids content have been investigated from leaf, stem & root of *Coriandrum sativum* is one of the most enrich leafy vegetable used by people in the globe. Comparative account of chlorophyll in leaf was in increasing order of monsoon<winter<summer. Protein content was seen in decreasing order of leaf>stem>root during monsoon, winter & summer respectively. Amino acids content was seen in decreasing order of leaf>stem>root during monsoon, winter & summer respectively.

Keywords- Coriandrum sativum, chlorophyll, protein, amino acids, seasons.

I. INTRODUCTION

First attested in English in the late fourteenth century, the word coriander derives from the Old French: coriandre, which occurs from Latin, Coriandrum, in turn from Ancient Greek: koriannon. The earliest attested form of the word is the Mycenaean Greek, composed in the Linear B syllabic script, (reconstructed as koriadnon), (similar to the name of Minos's daughter Ariadne) which later on evolved to koriannon or koriandron. Cilantro is the Spanish word for coriander, also deriving from Coriandrum. It is the common term in North American English for coriander leaves, due to their large scale usage in Mexican cuisine. Coriander grows wild over a spacious arena of Western Asia and southern Europe, prompting the remark, "It is difficult to determine precisely where this plant is wild and where it just recently made itself." Fifteen desiccated markups were found in the Pre Neolithic B level of the Nahal Hemar Cave in Israel, which may be the oldest archeological find of coriander. Almost half a liter of coriander markups was recovered from the tomb of Tutankhamen, and because this plant does not spring up wild in Egypt, Zohary and Hopf interpret this finding as proof that coriander was cultivated by the ancient Egyptians.

Whole constituents of the plant are edible, but the unused leaves and the dried seeds are usually used in cooking. Coriander is commonly found in Indian, Middle Eastern, South Asian, Southeast Asian, Tex-Mex, Latin American, Brazilian, Portuguese, Caucasian, Central Asian, Mediterranean, Chinese and African food.

Coriander leaves are the great source of vitamin C and A. The green herbs contain vitamin C up to 160 mg/100 g and vitamin A up to 12 mg/100 g (Girenko, 1982). Cilantro plant has regenerative capacity and hence 2-3 cuttings can be taken very easily. Menon and Khader (1997) and Thapa (1999) indicated that leaf plucking of the coriander seed crop at early phases can provide an additional income to the cultivators. Sharangi et al. (2011) presentet that, a foliar spray of nitrogen (2.5%urea) may be favorable for coriander leaf production under multicut system and the crop is fragile to rainfall, photo temperature, and morning humidity.

II. MATERIALS AND METHODS

The required species of Coriander was collected from the local market and was used for preparing the dry powder. Before sun drying it was separated into leaf, stem & root. The fresh material was used for chlorophyll estimation. The remaining was dried & converted into powder form. This particular procedure was carried out in seasonal format i.e., summer, monsoon & winter respectively.

Chlorophyll determination in the leaf:

Chlorophyll a, Chlorophyll b, and Carotenoids were extracted from the freshly plucked third leaf from the top using 80% acetone. Optical densities were recorded at 480, 510, 645 and 663nm. The amount of Chl .a, Chl b, and Carotenoid were calculated. Duxbury and Yestsch, in 1956 and Maclachalam and Zalik, in 1963 gave the following explanation

Quantitative estimation of protein:

1gm of plant material was homogenized with 10ml, 80% ethanol. The extract was centrifuged at 5000 rpm. For 5 min. and the supernatant was discarded. 5%, 10 ml Trichloroacetic acid (TCA) or per chloric acid (PCA) was add to residue and incubated at 80^0 C for 20 minutes. The pallet was recentrifuged and the supernatant was discarded. Residue was washed with 10 ml distilled water and again recentrifuged.

The supernatant was discarded. 2%, 10ml Na_2CO_3 in 0.1 N NaOH was add to the residue and incubated for an hour at 30^0 C. again centrifuged and residue was discarded. The final volume of supernatant was measured and it was used as a sample for protein.1ml of aliquot of sample was taken and 5ml reagent C was added to it mixed it thoroughly. The sample was incubated for 10 minutes and 1ml of reagent D was added to it. The colour intensity was read at 660 nm. Using spectrophotometer. The protein concentration of an unknown sample was calculated using standard graph.

Quantitative estimation of total Amino acid:

500 mg plant material was ground in mortar and pestle with few drops of cold 80% ethanol. Then 2.5ml of distilled water and 10ml of boiling 80% ethanol were added to it.The extract was centrifuged for 15 minutes at 10,000rpm.

Residue was discarded the supernatant was collected and total volume was made 15ml with distilled water. Test tube was kept at 60^0C for 20 minutes. The test tube was cooled and 1ml 50% ethanol was added. Read at 420 nm in spectrometer. Glycine was used as stand rand.

III. RESULT & DISCUSSION

CHLOROPHYLL

The duration of experimental period was from January to December- a period characterized by considerable changes in temperature, photoperiod, relative humidity and rainfall.

The temperature ranged between 38.9ºC in summer to 9.4ºC in winter. The photoperiod in summer was higher as compared to winter. Relative humidity was maximum during monsoon where as it was minimum in summer.

Our experimental result indicate that chlorophyll-a was higher in summer compared to winter & monsoon, and so was chlorophyll-b & carotenoids. Whereas chlorophyll-b was higher compared to chlorophyll-a and carotenoids which is shown in the table-1 below.

Table no-1

	Summer (mg/tissue)	Monsoon (mg/tissue)	Winter (mg/tissue)
Chlorophyll –a	0.091	0.048	0.078
Chlorophyll -b	0.121	0.062	0.112
Carotenoids	0.062	0.025	0.035

PROTEIN

Quantitative changes in proteins were determined in Coriander leaf, stem & root of the three seasons. All the results were computed on mg dry weight bases and changes in various constituents due to seasons.

According to the chart given below protein content of leaves was higher (3.44mg/g dry wt.) in summer over than winter (2.55mg/g dry wt.) and monsoon (1.91 mg/g dry wt.).

Range of protein content of stem was higher in summer (1.99mg/g dry wt.) as compared to winter (1.51mg/g dry wt.) & monsoon (1.09mg/g dry wt.) respectively.

In the similar manner protein content in root was lower as compared to leaves & stem and it ranged from (1.38 to 1.75 mg/g dry wt.). Hence the protein content shows increasing order of Root<Stem<Leaf.

The comparison can be studied in following table no.2.

Table no-2

Sr. No	Plant Part	Seasons (Protein) (mg/g)		
		Summer	Monsoon	Winter
1	Leaf	3.44	1.91	2.55
2	Stem	1.99	1.09	1.51
3	Root	1.75	1.38	1.46

AMINO ACIDS

The amino acid content of leaves was 0.32mg/g dry wt. in summer, 0.28 mg/g dry wt. in winter & 0.21 mg/g dry wt. in monsoon. Higher being observed during summer i.e. 0.32 mg/g dry wt.

The low range of amino acid content in stem was 0.17 mg/g dry wt. to 0.29 mg/g dry wt. Maximum concentration of amino acid was noted during summer i.e. 0.29 mg/g dry wt.

As compared to leaves and stem amino acid content in root was lower. It was 0.34 mg/g dry wt. in summer which was higher than winter 0.23 mg/g dry wt. & monsoon 0.18 mg/g dry wt.

Generally the concentration of amino acids were found to be in increasing order of Root<Stem<Leaf. Comparison can be studied in the following table no.3.

Table No-3

Sr. No.	Plant Parts	Seasons (Amino Acids) (mg/g)		
		Summer	Monsoon	Winter
1	Leaf	0.32	0.21	0.28
2	Stem	0.29	0.17	0.19
3	Root	0.34	0.18	0.23

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